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ABSTRACT

Reported are some significant events of 1972 related to the use and management of natural resources. Topics summarized include federal legislation for environmental quality; specific legislation for water quality; the development of state plans for achieving standards and controls related to air quality; population growth; land use and land policy; timber and forestry activities; natural gas concerns and the importation of liquefied natural gas; grain exports to Russia; international oil agreements; the U.N. Conference on the Human Environment; urban transportation and mass transit funding; technology assessment; bi- and multi-lateral arrangements on environmental matters; and national fishing quotas. (BL)

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RESOURCES

This issue reports on some significant events of 1972 relating to the use and management of natural resources

Some Highlights of 1972

Environmental Growing Pains

THE VOLUME OF NEW legislation and other federal and state actions taken in 1972 make it clearer than ever that environmental quality, a minority concern less than a decade ago, has been accepted by most Americans as a major national goal. But some of the difficulties of realizing this aspiration also became more apparent during the year: conflicts with other goals such as economic growth, national security, or budget balancing; and practical problems of designing public programs that don't attempt too much or too little, and of administering and enforcing them.

Two of the most important developments—sweeping revision of the Federal Water Pollution Control Act, and efforts toward setting up new programs for air quality—are discussed in separate articles below. But other significant 1972 legislation at the federal level has not stood still.

The Noise Control Act characterizes noise as a serious pollutor of the environment and for the first time recognizes a direct federal responsibility for doing something about it. The Environmental Protection Agency (EPA) is directed to take the lead in establishing emission standards, with the notable exceptions that primary responsibility for aircraft standards is given to the Federal Aviation Administration and for railroads and motor carriers to the Department of Transportation.

The Environmental Pesticide Control Act gives the federal government much broader authority than it has had under the Insecticide, Fungicide, and Rodenticide Act of 1947. While that act required registration and correct labeling of pesticides, the procedures for banning dangerous products were cumbersome and there were no penalties for misuse of pesticides once they had been properly labeled. The new law provides penalties for misuse for different categories of application and for a permit system that will differentiate between general and restricted use. It also tightens and simplifies enforcement procedures. EPA will be the responsible agency; some measure of state participation is provided for, although few of the details are spelled out. One section of the new act provides for indemnities to cover losses sustained by persons holding supplies of a pesticide whose registration has been suspended "to prevent an imminent hazard." This provision has been severely criticized by many environmentalists. They feel that it runs counter to a recent trend in the courts toward shifting the burden of proof to polluters and, from this point of view, could be a dangerous precedent. Moreover, prospects of high in-

* *See Note on back page.*

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demnity cost might make regulators hesitate to exercise their authority. On the other hand, no indemnities are due a claimant who continues to produce a pesticide after having knowledge that the product does not meet the requirements.

An act to regulate dumping of wastes in ocean and coastal waters prohibits discharge of high-level radioactive wastes and certain products related to chemical and biological warfare, and makes disposal of other materials subject to permit from EPA. [For a related international effort, see Stockholm, p. 13.]

A coastal zone management act provides federal funds to help coastal states develop land use plans that will balance needs for preservation against needs for industrial sites, power plants, port facilities, and recreation. In effect, this measure to protect ocean shorelines, estuaries, and wetlands is a segment of the broader national land use policy effort that failed of Congressional approval during the year.

In addition to cooperation called for in federally initiated programs, state activities reached a new high level in 1972. A *New York Times* survey last November reported that more than half of the 50 states had acted positively on a variety of environmental measures ranging from pollution control to limitation of population. In New York State, for example, voters approved a $1.15 billion bond issue for improving the environment. Florida adopted a constitutional amendment to permit buying more land for recreation, and voters there also approved a proposal to borrow $240 million to purchase land to be held against indiscriminate development. California voters approved creation of a public commission to control coastline development. In Colorado, voters turned down a proposal that the state spend $5 million to help prepare for the 1976 Winter Olympics —as an indication that they did not consider the expected economic benefits equal to the probable environmental damage. And several states established departments, commissions, or councils to deal with environmental problems.

MEANWHILE there were difficulties and delays in administering the environmental programs. Some resulted from the large burden of fact-finding for the determinations that EPA must make in establishing standards for air and water quality and for emissions of pollutants and in reviewing permits for waste discharges into streams. The Council on Environmental Quality (CEQ) also carried a heavy load in reviewing the impact statements prepared under the National Environmental Policy Act (NEPA)—statements required in connection with "major Federal actions significantly affecting the quality of the human environment."

Under NEPA, citizens may bring suit if they believe the act's purpose of preventing unnecessary environmental damage is not being carried out. Nearly 200 such suits were entered during the year, bringing to around 350 the total since the act went into effect at the start of 1970. Many of these cases, along with suits brought by or against EPA, have resulted in appeals to higher federal courts, so that a number of proposed government projects and EPA regulatory actions have been held up. It had been hoped that NEPA would be of assistance to the courts by providing guidelines in some complex and specialized areas. Thus far, CEQ and the Office of Management and Budget have done less than had been hoped toward policing administrative actions.

Some of the causes of delay may be reduced in the future as a larger body of judicial interpretations and precedents is established and all parties become more familiar with the comparatively new set of programs and procedures. The EPA workload, however, can be expected to increase, especially under the greatly expanded use of permits provided for in the new water quality act and the need for establishing an entirely new set of standards for noise.

New Legislation For Water Quality

WATER QUALITY has been a major responsibility of the national government since passage of the Federal Water Pollution Control Act in 1956. Extensive programs have been carried out; expenditures, despite year-to-year fluctuation, have steadily increased; and the law itself has been amended four times between 1961 and 1970. But over the 16-year period the condition of the nation's streams and lakes has, with some encouraging exceptions, continued to deteriorate. (How much worse the decline might have been in the absence of federal activity is another question.)

Legislation adopted last October under the disarming title "Federal Water Pollution Control Act Amendments of 1972" is a comprehensive measure that broadens the scope of the federal program and in some respects seems to start it down a new and, some think, a questionable track. While major reliance is still placed on state action, and subsidies and the imposition of standards remain the chief instruments for getting things done, the authorized subsidies are much larger, the standards higher, and the provisions for enforcing them stricter. Also there is a shift from effluent standards keyed to ambient water quality standards toward direct imposition of effluent standards that are not connected with environmental conditions.

The main impetus for the new legislation was the widely shared feeling that things were not going well. The Environmental Protection Agency, as quoted in the 1972 report of the Council on Environmental Quality, saw little improvement in the overall situation during the preceding year—27 percent of the nation's streams and shoreline miles polluted in 1970; 29 percent in 1971. As the agency pointed out, that estimate was rough and contained a sizable judgment factor. A study of firmer data from 140 selected federal and state water quality stations, commissioned by CEQ, showed a mixed picture for the 1965–70 period: a steady increase in nutrients that degrade fresh water by stimulating growth of algae and other unwanted aquatic plants; some increase in biochemical oxygen demand (BOD) from household and industrial wastes (this can lower the dissolved oxygen content to a point at which fish die and streams stink); no increase, perhaps a small improvement, in salinity; and a significant decrease in suspended solids.

Presidential messages in 1970

and 1971 recommended a number of changes in the existing law. Further ideas came from members of Congress and other sources. Separate water quality bills were passed by the *House* (November 1971) and the Senate (March 1972). The conference committee version, approved by both houses, was vetoed by the President in October, primarily on grounds of cost to the federal treasury. Congress promptly overrode the veto. A few weeks later, as discussed below, the President cut the authorized subsidies to states and cities by more than half.

Two national goals are set forth in the opening section of the 1972 Act: (1) ". . . that the discharge of pollutants into the navigable water be eliminated by 1985"; and (2) ". . . that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983."

Several of the innovations embody points proposed by the President:

—Extension of the federal-state program to all navigable water within the United States

—Effluent standards for individual plants that discharge water-borne wastes and, under different criteria, for publicly owned waste treatment plants

—Mandatory use in new facilities of the best available and economically achievable technology

—Stringent federal standards for toxic discharges

—Stronger and more streamlined federal enforcement procedure

—Heavier fines on violations, from $2,500 to $25,000 a day for a first offense and up to $50,000 a day for subsequent conviction

—Provisions by which citizens can bring legal actions to enforce standards

—Self-sufficient municipal financing of treatment plants after the current backlog of municipal needs has been met.

The new amendments also give EPA legislative authority to continue the nationwide permit system that was initiated by administrative action late in 1970 under the Refuse Act of 1899, whose objective was to protect navigation rather than control pollution. They also extend the system to include municipal treatment plants as well as industrial establishments. While the permits can be issued by states whose criteria and procedures have received federal approval, EPA is empowered to veto any individual permit that it considers unwarranted.

More emphasis is also placed on research, demonstration, and education, including work in basin planning and area-wide treatment systems, though the sums involved remain on a modest scale. They total slightly under 350 million dollars when funds authorized without time specifications are added to those authorized for the 1973 fiscal year. Less than half that amount is authorized for establishing and enforcing standards.

A STRIKING FEATURE of the 1972 amendments is the increased emphasis upon matching grants for construction of publicly owned waste treatment plants. Such grants have always been part of the program. Recently they have amounted to about $1 billion a year. The new legislation authorizes up to $5 billion in grants for the fiscal year 1973, $6 billion for 1974, and $7 billion in 1975. In addition there is an authorization of up to $2.75 billion for supplementary support for previous grantees. The maximum federal contribution to each project is changed from 55 to 75 percent.

The subsidy authorizations clearly are what prompted the President's veto of a bill that contained so many of his recommendations. Unlike most authorizations, these were not intended to require subsequent appropriation in a separate Congressional action. Many observers see the makings of a constitutional crisis, even though the tug between executive and legislative prerogatives is an old story. In December, New York City sued to compel EPA to pay the city its full share of the authorized subsidy, and other states and cities were considering similar actions. Even the EPA administrator conceded that there might be a legal question of the President's authority to limit the funds in the way he did. Some observers consider the authorizations unrealistically large, and see a dilemma in which irresponsibility of the legislative branch has transferred a decision to the executive branch, where it does not belong in a society based on representative government.

Aside from the budgetary issue, several aspects of the 1972 amendments raise questions of how well the new law will work. Even the preamble invites speculation. Zero discharge of pollutants by 1985? Many observers doubt that this goal can be attained then or ever. And even if it could be, they ask, would not much of the gain be at the expense of other environmental media —disposal of sludge, for example, either in the ground or, through incineration, in the atmosphere? Water fit for fish and swimmers by 1983? Here, too, similar questions arise. Both of these aspirations are, it is true, set forth simply as goals and so perhaps should not be taken literally. But their presence in formal language may well invite misunderstanding, skepticism, and eventual disillusionment. And the two goals, especially that of 1983, seem to have colored some specific provisions of the act. For instance, effluent limitations for 1977 are to require "applications of the best practicable control technology currently available," and those for 1983, "the best available technology economically achievable."

Incidentally, these requirements are more inflexible than those of the House version of the bill, which provided that after 1976 (changed in conference to 1977) determination of the levels of technology to be used in setting standards should await a study by the National Academies of Science and of Engineering of the economic, social, and environmental effects of achieving or not achieving the goals. In its final form the act provides for a feasibility study of the 1983 goal, but the results are not specifically linked to establishment of standards, and the study is to be made by a National Study Commission to be composed of five members each

from House and Senate Public Works Committees and five public members appointed by the President.

Increased use of the permit system may not be as workable as was once hoped. Presumably the difficulties encountered in enforcing ambient standards for water quality were the main reason for seeking a shortcut to the elaborate procedures required. For the past two years individual permits have been tried on a moderate scale under authority of the ancient Refuse Act. Although their issuance is simpler, appeals to the courts have held up many cases. There is not as yet enough experience to show whether such delays are a temporary or permanent phenomenon. With explicit new authority to issue permits, EPA can be expected to make them its main enforcement device. Ultimately, no less than 50,000 permits may be needed. This would place a huge job of resource allocation in the lap of the federal government. (While states eventually would take over most of the routine, EPA would be responsible not only for approving state systems, but for exercising detailed supervision thereafter, even to the veto of individual permits.) It is hard to see how such a task can be carried out without most of the knowledge of prices, technology, and markets that a plant manager possesses for his particular establishment. A larger volume of appeals to the courts appears likely.

The act provides for setting effluent standards on a national basis, without regard to differences in circumstances among areas or kinds of activity. Much economic research indicates that ambient standards can be achieved much more efficiently if efforts are concentrated where costs are least. Pollution taxes (or effluent charges) merit as much attention in water quality management as in management of air quality. Also, except for feedlots, runoff from agriculture is not covered in the amended act. In some areas this is a major source of water pollution. Finally, economic research has also shown that integrated approaches to water quality on a river basin basis tend to substantially reduce the cost of achieving environmental targets. Aside from its provisions for assistance to planning, the new legislation does not exploit these opportunities.

Air Quality

IN THE field of air quality, 1972 was primarily a year of tooling up for the new type of program called for by the 1970 amendments to the Clean Air Act. Under the original law the main objective had been to set up regional airsheds in which standards and controls could be established. The present approach emphasizes the setting of national standards for ambient air quality as well as, in a number of instances, for the emission of pollutants. Essential to the whole effort are submission of state plans for achieving standards and review of these plans by the Environmental Protection Agency. This phase of the work was carried far along during the past year.

Well before the year began, EPA had established primary and secondary standards of ambient air quality for six of the most prevalent air pollutants—particulate matter, sulfur oxides, carbon monoxide, hydrocarbons, oxides of nitrogen, and photochemical oxidants. Primary standards are designed to protect public health; secondary ones (which are more stringent) to safeguard aesthetic values, vegetation, and materials. Each state is required to offer a program by which primary standards can be reached three years after its plan is approved by EPA, and for achieving secondary standards "within a reasonable time period."

By early 1972, all 50 states and the five other jurisdictions that rank just below the national level had submitted plans. On 31 May, EPA approved 14 of these plans and partially approved the others. By the end of the year a total of 24 plans had been completely approved. The reasons for withholding complete approval ranged from EPA questioning of one or two items to absence or near absence of detailed provisions for attaining secondary, or sometimes even primary, standards. Many states appear to have given more attention to legal authority to implement plans than to the plans themselves.

State plans and state laws enacted thus far indicate that much reliance will be placed on some form of permit system under which persons wishing to build new plants will submit specifications to an air quality commission, or its equivalent, for a determination of whether the new plant will comply with pollution control standards. It is hard to foretell what other kinds of planning and enforcement problems will arise: How much monitoring will be required? What about existing plants? Nor is it yet clear how the permits for emissions from new plants will be linked to ambient standards; if efficiency is a consideration such determinations will be difficult.

The automobile, which in most urban areas is by far the largest source of air pollution, presents control problems different from those of plants at fixed sites. The federal government is responsible for establishing standards for new cars but not for those already in use. Some states will have to abate emissions from older cars in order to meet EPA's ambient standards. The plans submitted by a number of states call for strict controls over vehicles, especially in cities. New Jersey, for example, last July made annual testing for emissions a part of its regular safety inspection. Cars that fail the test are not allowed on the road unless the deficiencies have been corrected within a few days.

The 1970 amendments provided that the 1975 federal standards for new cars should set emission limits for carbon monoxide and hydrocarbons 90 percent below the 1970 standard. (Because of control measures already taken, the 1975 standards represent a drop of about 97 percent from an uncontrolled situation.) 1976 standards for oxides of nitrogen require a 90 percent decrease from 1970 when no controls were in effect.

The law permits one-year extension of the deadlines under carefully defined conditions. Last spring all of the major U.S. manufacturers of motor vehicles (except American Motors), together with Volvo, requested EPA to defer the emission

standards for a year. In May, after public hearings, Administrator Ruckelshaus denied the request. Conceding that the standards would be hard to meet, he said that the companies had not established, as the law requires, that the necessary technology does not exist. He referred especially to progress in developing catalytic reactors to control emissions. The manufacturers appealed his decision to a federal court.

Some of the technical problems of controlling emissions are formidable, especially in regard to oxides of nitrogen for which the catalytic reactor appears to be the most effective curb in the present type of internal combustion engine. Use of the reactor, together with controls for carbon monoxide and hydrocarbons, would materially reduce the advantage of the internal combustion engine over other sources of automotive power. The automobile companies estimate the cut in thermal efficiency at about 30 percent. At present levels of driving this would mean a large increase in gasoline demand, which already accounts for 16 percent of primary energy use in the United States. Although the estimate of efficiency loss has been disputed, everyone agrees it would be substantial. Control devices also would add significantly to the cost of automobiles. By just how much is in dispute, but the range of $245 to $425 estimated by a consultant to EPA (published in March 1972) is not too far from most of the opinions. The consultant also estimated that from 84 to 98 percent of the cost increases associated with air pollution equipment would be passed on in the form of higher automobile prices. The costs of maintaining the efficiency of the anti-pollution devices also are still subject to debate.

In December EPA issued regulations designed to make one grade of lead-free gasoline generally available by 1 July 1974. Earlier in the year, the agency also called for a phased reduction in the lead content of all regular and premium gasoline. Besides generally helping to reduce air pollution, these measures would increase the effectiveness of the catalytic reactors. Lead in gasoline seriously fouls these devices.

There is no doubt that actions taken during the year under current programs will mitigate pollution from motor vehicles. But how much and for how long? Some observers believe that the larger problems, especially that of smog, will not be solved while the internal combustion engine is the dominant power source for motor vehicles. They also question the long-run effectiveness of present sanctions: If the ambient air and emission standards should not be met, is there any real chance that the industry would shut down?

Other doubts concern the more immediate future. Perhaps the most outstanding example is the reliance placed in many state plans upon improved and expanded mass transit. While almost everyone agrees that such a development could go far toward cleaning up the air of cities, the chances of making significant gains in time to meet standards for 1974, or even for a few years thereafter, are open to question.

Under discretionary authority granted by the Clean Air Amendments, EPA in its review of plans gave two-year extensions for meeting primary standards to 18 states that contain urban areas suffering severe pollution from automobiles. Thirteen states were granted an 18-month extension—to 30 July 1973—for submitting plans to implement secondary quality standards for 31 air quality control areas that had been established under the original act. These decisions have been appealed to the courts by both industry and environmental groups.

During the year a federal district court ruled that the EPA Administrator could not approve a state plan that would permit deterioration of air quality in areas where existing quality already was above the standards established for the whole country. EPA appealed the decision, and in November was granted a stay until the full Supreme Court could consider the case next year.

As with water quality and indeed all of the comparatively recent environmental programs, it is too early to tell whether the spate of legal challenges will recede after more precedents have been established and administrative actions adjusted accordingly, or whether they will be an enduring obstacle to efforts based mainly on the police power.

An attempt to provide the clean air program with an additional lever was made last February when the Administration submitted to Congress the draft of a "Pure Air Tax of 1972." Another proposal, introduced by Senator Proxmire, was aimed at the same end but by somewhat different means. Neither bill came even to the hearings stage during the sessions, but the idea they represent is far from dead.

The Administration bill called for a tax on emissions of sulfur to the atmosphere, to begin in the calendar year 1976. The tax would be levied only in regions where EPA's ambient standards had not been met during the preceding year. Rates for 1976 were set at 15 cents per pound of sulfur emitted in areas where primary standards had not been met, and 10 cents a pound where only secondary standards had been violated.

The Proxmire-Aspin proposal (Representative Aspin had introduced a similar bill in 1971) would tax the sulfur content of fuels shipped to electric power plants in all regions. The rate of 5 cents a pound for the first year would be increased annually by 5 cents to a maximum of 20 cents. Firms that trapped part or all of the residual sulfur in their smokestacks would receive corresponding tax rebates.

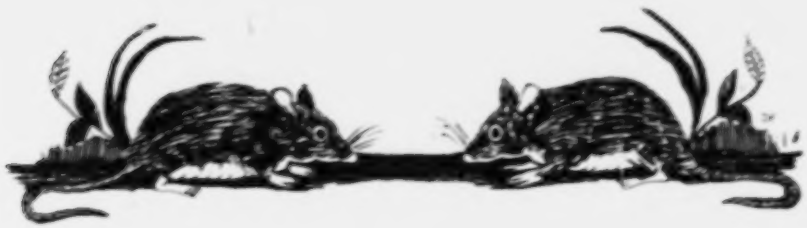
Sulfur oxides are among the largest sources of air pollution in the United States and are perhaps the most harmful of all in terms of public health. In his 1971 environmental message the President declared that sulfur oxides cost society billions of dollars a year in damage to human health, materials, vegetation, and property. He also said that to levy a charge on sulfur emissions would be a major step in applying the principle that the costs of pollution be included in the price of the product. In its 1972 report, the Council on Environmental Quality pointed out that the Pure Air Tax "should stimulate firms to develop and install control technology and use clean fuels as quickly as possible to minimize their tax liability" and that it would "create a strong financial incentive for companies to meet secondary standards by 1975, or as soon thereafter as possible. . . ."

The tax proposal, both as a specific attack on sulfur pollution and as an approach to other environ-

mental problems, is sure to be revived in the 93rd Congress. Several environmentalist groups (many of which until recently had been cool to the tax idea) are planning to give the issue high priority in 1973. While many disagree with some of the specific provisions of the Administration bill, it is clear that they would much rather see the Administration bill passed than have no legislation at all.

Most economists interested in environmental problems favor the tax approach, believing that it will accomplish more than direct regulation and will cost less. Although regulation will have its uses under many circumstances, the principle behind taxing pollution could be applied toward greater flexibility and efficiency in many environmental programs.

The 1971 environmental message that first mentioned a tax on sulfur emissions also proposed a tax on lead in gasoline that would encourage the production and sale of lead-free fuel. The Administration submitted no bill along those lines during the year, nor was the idea mentioned in the 1972 report of the Council on Environmental Quality.



REPORT ON POPULATION

THE REPORT submitted last March by the Commission on Population Growth and the American Future was broad in its scope and forthright in its recommendations. The close relationship between population size and most problems of natural resources and the environment sufficed in itself to make the document a landmark in both those areas. In addition, the report gave explicit attention to questions of resource adequacy and environmental quality.

"After two years of concentrated effort," the commission chairman, John D. Rockefeller 3rd, wrote in his letter of transmittal to the President, "we have concluded that, in the long run, no substantial benefits will result from further growth of the Nation's population, rather, that the gradual stabilization of our population through voluntary means would contribute significantly to the Nation's ability to solve its problems."

The idea is carried further in the report itself: "We have examined the effects that future growth alternatives are likely to have on our economy, society, government, resources, and environment and we have found no convincing argument for continued national population growth. On the contrary, the plusses seem to be on the side of slowing growth and eventually stopping it altogether. Indeed, there might be no reason to fear a decline in population once we are past the period of growth that is in store."

There was nothing in this conclusion to surprise anyone familiar with long-range population or resources problems; in fact, the emphasis on gradual stabilization struck some observers as being over-mild. But coming from a panel representing the highest level of national government, established by act of Congress on recommendation of the President, the report broke new ground.

Between 1900 and 1970 the U.S. population rose from about 76 million to almost 205 million. The annual rate of growth over that period was erratic. From 2.1 percent during the first decade of the century it fell to around 0.7 percent in the 1930s, rose to around 1.9 percent during the 1950s, the period of the "baby boom," and had fallen to around 1.1 percent by the time the commission completed its research late in 1971. But, as the report points out, even that low rate would add 2¼ million people a year because our population is now so large.

"We cannot predict how fast our population will grow in the years ahead," the report adds, "but we can be sure that, barring some unforeseen catastrophe, substantial additions to our numbers lie ahead. Our population has a potential for further growth greater than that of almost any other advanced country." Among the reasons cited is the preponderance of youth in the population. "The youngsters born during the baby boom are reaching adulthood today—finishing school, seeking jobs, developing careers, getting married, and having children of their own. Even if immigration from abroad ceased and couples had only two children on the average, just enough to replace themselves, our population would continue to grow for about 70 years."

In looking ahead, the commission drew several comparisons between an average of two children per family (approximately the current rate) and of three children per family (considered the norm until a few years ago). One hundred years from now the two-child family would result in a population of about 350 million persons, whereas the three-child family would produce a total of nearly a billion.

In following out its mandate to look at all of the major implications of population growth in the United States, the commission, in addition to considering national trends, studied a number of special aspects. Among these was the impact of growth on natural resources and the environment. Other major topics were: (1) the distribution of population among urban and rural areas; (2) effects on the general economy; and (3) impacts upon government at all levels. Special attention also was given to problems of the aged, child care, racial and ethnic minorities, the status of women, and research and education needs. A series of research papers on such specialized subjects were planned as supplements to the main report. [One of these volumes, *Population, Resources, and the Environment*, primarily prepared by RFF, was published in December.] Although the commission concentrated on domestic aspects of population

growth, the report at several points took note of the worldwide prospect as a problem of vast importance in its own right as well as for its implications for the United States.

THE REPORT noted that for the next three decades general economic growth will probably be a stronger factor than population in demand for nonfuel minerals, and technology the stronger factor in energy supply and demand. Population appeared to be more important in problems of regional water supply, agricultural land, and outdoor recreation. As for environmental quality, progress over the next 30 years was seen as depending more on direct efforts to reduce the emission of pollutants than on population growth. However, the report points out, many such programs will require more public regulation and restrictions on individual actions than Americans are accustomed to. Also, along with efforts to meet demands from resource materials, remedial actions will often call for introducing new technologies before we know enough about how they work and what their full effects will be. Population growth will aggravate such problems.

The commission found that with regard to both resources and the environment "slower population growth can contribute to the Nation's ability to solve its problems . . . by providing an opportunity to devote resources to the quality of life rather than its quantity, and by 'buying time' . . . that is, slowing the pace at which problems accumulate so as to provide opportunity for orderly and democratic solutions."

The commission concluded that in the long run "population growth is one of the major factors affecting the demand for resources and the deterioration of the environment. The further we look into the future, the more important population becomes."

In the course of its report the commission offered 47 recommendations for action by government at various levels, schools and universities, professional groups, and the public at large. The wide range of suggestions included better child care services, freer choice of housing in metropolitan areas, guidelines for national distribution of population, and expanded research and education on population problems.

In view of the commission's strong conviction that population growth should be first slowed and then stopped, and its emphasis upon voluntary methods, the recommendations on human reproduction were critical to the whole report. Here the commission met the main issue directly, though with a caution appropriate to so sensitive and controversial an area. Citing fragmentary evidence that suggests that a sizable fraction—perhaps one-sixth—of recent births in the United States was unwanted, or at least unplanned, the report observes that prevention of these births would have taken the country a long way, perhaps halfway, to the replacement level. (One gathers from other sections of the report that going the full way would have depended on education on population problems and principles and other long-term measures.) Steps recommended for reducing the number of unwanted births included the following:

—Greater investment in research and development of improved methods of contraception
—Elimination of legal restrictions on access to contraceptive information and services, and affirmative state legislation to permit minors as well as adults to receive such information and services
—Elimination of administrative restrictions on access to voluntary contraceptive sterilization
—Liberalization of state abortion laws (advocated primarily to offer women more freedom of choice and to get rid of quacks and shysters).

Five of the commission's 24 members dissented on various grounds from the last-named recommendation, the exact wording of which was:

"Therefore, with the admonition that abortion not be considered a primary means of fertility control, the Commission recommends that present state laws restricting abortion be liberalized along the lines of the New York State statute, such abortions to be performed on request by licensed physicians under conditions of medical safety."

The commission's two-year life ended last March. It had discharged its formal responsibility by turning in a report outstanding for both its content and the clarity of its presentation. Issued as a paperback by a commercial publisher as well as by the Government Printing Office, the document was widely circulated and well received by the daily press and by periodicals. The public response might have been even greater had the U.S. birthrate not dropped so markedly during the life of the commission and (as noted below) continued to fall during 1972. This coincidence may have led some people to relax with a comfortable feeling that the population problem had gone away.

WHAT NEXT? Reports of other distinguished Congressional or Presidential commissions have received wide public attention and ended up by gathering dust in the files. It is still too early to say what will happen, but by the end of the year a few indications were apparent.

Organized effort to publicize and interpret the report will continue. A privately financed Citizens Committee on Population and the American Future was established at the request of the commission, and will operate for a year. One of the committee's first undertakings was a one-hour television film on the commission's findings which, on its first presentation late in November, was followed by another hour of discussion.

Official reactions to the report were mixed. The President, on whose recommendation the commission had been established, complimented the panel for performing a valuable public service, but declined at that time to "comment extensively on the contents and recommendations of the report." He added that the report would be studied by the executive branch and that its recommendations would be taken into account in policy and budgetary decisions. By the close of the year no results of any formal review had been made public, although in April the commission's executive director, Charles F. Westoff, testified on request before the President's Science Advisory Committee. The President did, however, publicly reject two of the commission's recommendations, commenting that open abortion policies "would demean human life," and that widespread distribution of family planning services and devices to minors "would do nothing to pre-

serve and strengthen close family relationships."

The Administration's restrained reception was something of an anticlimax. After all, Mr. Nixon had been the first President to send Congress a major message on this politically touchy subject; ten years earlier President Eisenhower had said that birth control was not the government's business. The Administration's public response may have been influenced by the fact that the report was issued in a presidential election year; on the eve of a second term some of the early reactions should perhaps be discounted.

Congressional responses may also have been tempered by the election. Although no concrete legislative proposal had been advanced by the end of the year, members of the commission and its staff gave testimony, upon invitation, before the Urban Growth Subcommittee of the House Banking and Currency Committee, the Senate Appropriations Committee, and the Task Force on Population Growth and Ecology of the House Republican Research Committee. The responses of the new 93rd Congress remain to be seen.

THE DOWNTREND in the U.S. population growth rate that the commission had noted in its report continued into 1972. The estimated fertility rate for the first nine months of the year, for the first time in the nation's history, fell below the replacement level of 2.1 children per woman. True, it was only a shade below—2.08 was the figure announced in December by the Department of Health, Education, and Welfare—but the contrast with the 2.39 figure for the corresponding months of 1971 is significant. So is the fact that last September was the 19th consecutive month in which the birth rate had been lower than for the same month in the previous year.

Despite a rise in the number of women of childbearing age, the total of 2.4 million births in the first nine months of 1972 was 9 percent down from the figure for the first nine months of 1971.

In the light of the most recent data, Census Bureau alternate projections for the year 2000, announced in mid-December, were about 20 million lower than those of two years earlier. The new projections range from a high of 300 million to a low of 251 million.

To those who believe, with the commission, that a stabilized population would be good for the country, the new figures are encouraging but not cause for complacency. Though useful as a bench mark, the much discussed 2.1 replacement level makes no allowance for immigration, which currently is adding about 400,000 new people a year, an increment which the Bureau of the Census assumed in making its new projections. Even if there were to be no more immigrants and if the fertility rate should stay around its new low level, the U.S. population would keep on growing until the middle of the next century. Furthermore, no one can be sure that the level of fertility won't turn upward again. It has taken great swings in the past, the all-time high of 1957 came less than 20 years after the previous low point of 2.2 in the Depression era.

Demographers, in and out of government, are keeping their fingers crossed.

LAND USE AND LAND POLICY

ALTHOUGH SOME land use legislation passed in 1972, most of the important bills were still pending when Congress adjourned. Other action on land matters took place within the executive branch; in particular, the Bureau of Outdoor Recreation began a new effort at preparing a national park and recreation plan. (A plan prepared a few years ago has never been made public and seems unlikely ever to be released.) A rising tide of popular interest in land planning continues among many citizen groups. A number of states have passed land use legislation or are seriously considering it, and have begun or accelerated important land use planning efforts.

One federal bill that did not pass was concerned with strip mining, especially for coal. Half of all coal is mined today by stripping methods; costs are often much lower than for underground mining. But so is employment per ton produced, and environmental havoc has been so great in some instances as to arouse intense public opposition.

Efforts to pass legislation raise a number of important but difficult policy questions: How much public control should be exercised over private mining? Which level of government should exercise these controls? If costs are increased, who bears the difference? How much restoration of the mined-out areas is technically possible, and what costs can defensibly be incurred? How does a government agency guarantee that the private operator will actually carry out the degree of surface restoration that the law requires?

Thus far, federal legislation has not faced up to these questions. State laws vary widely; many of them are criticized by conservationists as woefully weak. It seems probable, but far from certain, that some form of federal legislation dealing with strip mining will pass in the next year or two.

The Public Land Law Review Commission, which completed its work in 1970, made many recommendations for modification of federal land law. Bills have been introduced in both House and Senate, but none has yet been passed by either house. In the House, changes in public land law and provision for national land use planning were included in a single bill; in the Senate, the two measures were separate.

The executive branch reacted adversely to the House version; it had offered its own proposal to each house. Some new legislation seems probable; how soon is much less certain.

The greatest legislative activity arose over a national land use planning proposal. After extensive hearings and studies, the Senate Committee for Interior and Insular Affairs reported out a bill which passed the Senate in September.

The bill as reported was modified by the Senate as a whole, notably by removal of severe penalties in terms of lost grants in aid for highways, airports, and other purposes, for any state not conforming to the act. Proposed amendments to include more policy guidelines for the state and federal agencies concerned were beaten.

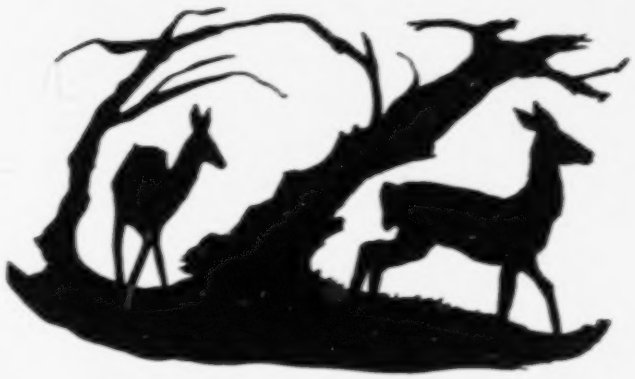
The bill as passed is more procedural than substantive. It provides a system of federal, state, and local planning with federal grants in aid to assist the states; but it leaves the content of the plans almost wholly up to the states. Neither the bill nor the debates on it gave much recognition to the possibility that divergent private interests might not agree on a general land use plan, nor was there much consideration of the implementation of any plans that might be developed. The Senate bill had general executive branch endorsement.

The House bill, which differed in several respects from the Senate bill encountered strong objections (mostly for its public land law provisions) from both the executive branch and conservation groups. The form of the House bill had been greatly influenced by the position of the committee chairman, Congressman Wayne N. Aspinall; with his defeat in the primary election, the form of future House action was placed in considerable doubt.

STIRRINGS IN THE WOODS

THE PAST FEW YEARS have seen a renewed public interest in forests; 1972 was no exception. In some parts of the United States competition for forest land is severe. A great deal of privately owned forest land is held for the personal use of the owner and his family, not for producing wood products for sale. Forest land for such purposes often brings prices too high to permit a reasonable return on investment in commercial forestry. On public lands, various groups or interests have contended for the sole or dominant use of certain forest areas.

A number of conservation groups that had joined forces to sue the



Forest Service obtained a temporary federal court injunction early in the year against road building or timber sales in most of the remaining larger roadless areas of the national forests. The argument is that further consideration is necessary before the present more or less wilderness character of each such area is lost. At the end of the year efforts were under way to work out an agreement between the conservation groups, the forest products industry, and the Forest Service, with respect to this suit. The Forest Service is expected to make public in early 1973 its recommendation for or against inclusion of the various areas in the wilderness system; but this is unlikely to end all of the controversy.

Both wilderness areas and developed recreation areas on many kinds of federal and state lands experienced record high use in 1972, although in a few areas, including Yellowstone National Park, total use was lower than in some recent years. Excessive use is threatening physical damage to many areas, and destruction of the solitude and unique qualities of the wilderness.

Other current concerns about forests involve the growth and harvest of trees for various wood products. Achievement of the national housing goals accepted by the Administration and by Congress would require far more wood than has been harvested in recent years, at least as long as present wood-using practices in construction continue. Various metals, concrete, and plastics can replace wood in some uses, but their production requires several times as much energy as does wood product manufacture; they are exhaustible resources while wood is a renewable one, and their environmental impact is far greater than that of wood growth and harvest. Moreover, attainment of the full housing goals is especially important for the lower-income groups; if housing is scarce, it is they who suffer most.

Total wood production today is but a fraction of what the forests of the United States are capable of. Much interest therefore attaches to measures to increase wood growth. In the long run, wood harvest cannot exceed growth, for continuance of such a relationship would in time denude the forests of growing stock. But, also in the long run, wood growth cannot exceed harvest: only as mature trees are cut and removed can there be any net growth of new trees.

One intense controversy, relating to clearcutting of forests, was at least partially defused in 1972. At the beginning of the year, the Council on Environmental Quality proposed an executive order to establish guidelines to govern clearcutting on federal forests. This order, vigorously opposed by the forest products industry, was never issued.

In April the Subcommittee of Public Lands of the Senate Interior and Insular Affairs Committee issued a set of guidelines on clearcutting on federal forest lands. Among other provisions, these guidelines specified that (1) allowable cuts on federal forest land should be reviewed periodically, to ensure that only lands capable of timber harvest be included in the allowable cut and that the effect of improved forestry practices be taken into account only to the extent that continuation of such practices is assured; (2) clearcutting shall be employed only where natu-

ral conditions permit, where restocking within five years is assured, and where aesthetic values do not outweigh other considerations; and (3) clearcutting shall be used only where it is silviculturally essential, where clearcut blocks are kept to a minimum size to accomplish silvicultural objectives, and where the clearcut blocks are shaped and blended as much as possible with the natural terrain.

These guidelines were immediately accepted by the Forest Service and by the Department of the Interior. While some conservation groups may not be wholly satisfied with them, the guidelines appear to have taken most of the controversy out of clearcutting.

NATURAL GAS

AS CONCERN OVER what is termed the U.S. "energy crisis" mounted during the year, the Federal Power Commission (FPC) took two actions to alleviate the situation. Both related to natural gas, a fuel accounting for about one-third of nationwide energy consumption and—largely because of its importance in space heating—a far greater share of residential energy use.

In recent years the consumption of natural gas has increased at an annual rate of around 7 percent, much faster than that of the other fossil fuels. There are indications that not enough natural gas will be available domestically to accommodate continued national increases in demand. Even now, in a number of utility areas around the country, distributors are beginning to refuse new gas hookups for certain classes of customers.

Although it is widely agreed that immense gas resources remain to be discovered in the United States, the ratio of U.S. proved reserves to annual production has fallen continuously over the last several decades. Until 1967, however, additions to reserves still were somewhat larger than production, so that the reserve total rose modestly each year. Since then reserves have been falling absolutely, even if one includes the reserve additions presently ascribed to the Alaskan North Slope. Reasons for this state of affairs are a subject of intense debate, but the inhibiting effect of governmentally regulated ceilings on the field price of gas has been singled out most often as the principal contributing factor if not the sole one. An RFF study published during the year (*Regulation of the Natural Gas Producing Industry*, based on seminar papers by legal and economic experts from industry, universities, and other research institutions) reflected that judgment by stating in a summary presentation:

> FPC regulation of the maximum price that jurisdictional purchasers are allowed to pay producers of natural gas seems to have been at least partially responsible for the current unsatisfactory conditions existing in the natural gas producing and distributing industries. At current price levels, the quantity of gas demanded by consumers considerably exceeds that which producers are willing to supply. There is no evidence that large enough quantities of substitutes for natural gas produced in the forty-eight contiguous states (gas from coal or oil, Canadian imports by pipeline, or liquefied natural gas from Alaska or foreign countries) will be available in the next decade to substantially reduce the projected demand growth for natural gas, either at current or prospective equilibrium natural gas prices. Therefore, providing market conditions under which quantity of natural gas supplied is likely to increase to quantity demanded seems to be the only way to end the current problem.

An anomalous consequence of natural gas price regulation is the fact that this environmentally most desirable fuel has been priced below "dirtier" alternative fuels and has been channeled into what some regard as less-than-optimum uses (e.g., as an electric utility boiler fuel: in 1970, natural gas was priced 13 cents/million Btu below oil and 2 cents/million Btu below coal). Attempts to increase natural gas availability for U.S. users include the importation of Algerian liquefied natural gas (LNG) and efforts to obtain gas from coal. Both of these sources, however, are presently judged to result in prices far above those of controlled wellhead prices today.

During 1972, the FPC took the first major step towards changing its regulatory approach to natural gas pricing. Citing a "worsening of the gap between natural gas demand and supply," the commission adopted a new policy, which gives producers the option of selling new supplies of natural gas in interstate markets at a level above prevailing area wellhead price ceilings. This rule covers only newly discovered reserves or those diverted from the *intra*-state market, which is not subject to FPC regulation. Although it retains the power to modify or disapprove prices so negotiated, the FPC clearly has instituted the new measure in order to encourage the search for new gas reserves and their subsequent development.

In November, the FPC sanctioned the first contract under the new rules. It provided for a wellhead price of around 26 cents/1,000 cubic feet—some 5 cents above the existing price ceilings for the producing area in question. It will perhaps take some years—and, conceivably, additional policy encouragement—before one can tell whether the recent change has had the desired effect of eliciting substantial additions to domestic natural gas reserves.

Steps leading to the importation of the first significant quantities of imported liquefied natural gas (LNG) were taken during the year when the commission authorized the importation over a 25-year period of Algerian LNG in amounts rising to a daily volume of 1 billion cubic feet. The anticipated first full year of LNG deliveries on the U.S. East Coast is 1977. The gas would be shipped by the El Paso Natural Gas Company in nine tankers specially built for maintaining temperatures of −260F. The gas would be sold to three major pipelines and would represent between 10 to 20 percent of their total natural gas supplies. The imported gas will cost approximately 60 percent more than the East Coast delivered price of domestic gas. Three of the tankers will be built in U.S. shipyards

with $76 million in Federal Maritime Administration construction cost subsidies. Another $64 million in these subsidies has been authorized for construction in domestic yards of three additional LNG tankers.

The FPC will require that pipelines charge their distributor-customers with the considerably higher cost of the imported gas rather than with the lower cost of their overall (domestic plus foreign) gas deliveries. The FPC rescinded an earlier ruling, which would have compelled local gas utilities to bill their ultimate customers on the high incremental-cost basis, but even the rule finally adopted introduces a novel element in pricing policy. It could, for example, prompt local public regulatory bodies to be much more sensitive to the availability of alternative gas supplies at lower cost. It could also prompt these bodies to do what the FPC was finally unwilling to do—force final customers to bear the full marginal cost of these incremental supplies.

In these and other ways that will undoubtedly surface in the future, the prospective introduction of LNG to the U.S. energy scene promises to trigger entirely new issues and controversy. The environmental aspects of the terminal facilities needed for receiving and regasifying the LNG shipments were subjected throughout much of the year to critical scrutiny. And the prospect—coming to light at year's end—of possibly substantial LNG imports from the Soviet Union seems bound, in the wake of the Algerian agreements already reached, to raise the national security implications of increased external energy dependence for natural gas, just as has perennially been the case with oil.

GRAIN TO RUSSIA: FLUKE OR TREND?

IN AGRICULTURE the most surprising event of 1972 was Russia's purchase of 400 million bushels of U.S. wheat: more than a third of the record-breaking total of U.S. exports for the year and more than half of average U.S. wheat exports for the half dozen preceding years. Another surprise, though on a far smaller scale, was the sale of 15 million bushels of wheat to the People's Republic of China, which until last year has had no trade with the United States. Late in the year India, facing near famine conditions because of poor harvests, began to buy wheat in this country. As a result of all this, the 865 million bushel carryover with which the country entered the marketing year will be nearly cut in half.

To a large extent this upsurge in exports was fortuitous. The world wheat situation was unusual: Russia's crop was drastically cut by bad weather. For varied reasons, including weather, three of the four major exporting countries—Canada, Australia, and Argentina—had relatively small supplies of uncommitted wheat. The United States had ample supplies and was eager to sell them. It is unlikely that in normal years Russia will be a large-scale buyer of American wheat; since 1965 she had been a net exporter.

However, some aspects of the year's developments, especially for grains other than wheat, may have significant implications for the future. In addition to its wheat purchases, the U.S.S.R. bought more than 250 million bushels of corn and 40 million bushels of soybeans from the United States last year. Since Russia appears to be firmly committed to its goal of providing her people with more livestock products, the outlook for continued purchases of U.S. feed grains, including sorghums, is favorable. U.S. Department of Agriculture analysts believe that this particular source of demand will continue for three to five years.

Also, the recent thaw in U.S. relations with the two large Communist countries could have general effects upon agricultural trade. Since Mainland China had bought nothing from the United States prior to this year, its purchases of wheat, plus 275 million bushels of corn and 22 million pounds of linseed oil, may be of more future importance than the relatively small amounts suggest. On the other hand, there may be some built-in limits to large expansions of farm exports to either Russia or China. Trade with Communist countries involves much more than the economic factors that usually dominate transactions in capitalistic countries; either nation could decide to import or export for political reasons, either internal or external. Also, and perhaps more important, neither country has large amounts of foreign exchange with which to purchase commodities from abroad.

Secretary of Agriculture Earl J. Butz commented on the latter problem in a speech last November. Referring to the possibilities of U.S. purchases of natural gas from the Soviet Union he said: "We *need* natural gas—Russia *has* natural gas. Russia *needs* food and feed grains—we *have* food and feed grains. When an agreement is reached for this country to obtain fuel energy from Russia, that fuel won't be paid for with rubles. It will be paid for with corn and soybeans and wheat and sophisticated electronics, for example. We will trade grain, which we can produce abundantly and efficiently (and which Russia cannot produce abundantly and efficiently), for fuel, which Russia has in abundance (and of which our supply is limited and costly to extract)."

It was a long-range and oversimplified speculation on a most uncertain and complex situation. The gas negotiations were still in a very preliminary stage at the end of the year. If an agreement should be reached, much more would be involved than a barter of Russian gas for U.S. farm products. For example, it is likely that American capital, probably with government guarantees, would be needed to develop the pipeline and other facilities for bringing the gas to the point of shipment. Nevertheless, it was interesting that the thought should be voiced by a Cabinet officer. It is even more interesting to speculate upon the effects of any sustained rise in farm exports—whether to Communist countries or others—upon U.S. agricultural policy. Present programs of holding land out of production and offering export subsidies still are based on the idea of protecting farmers from the burdens of producing too much.

INTERNATIONAL OIL

LATE IN THE YEAR the representatives of four Persian Gulf members of the Organization of Petroleum Exporting Countries (OPEC)—Saudi Arabia, Kuwait, Abu Dhabi, and Qatar—and of the international oil companies operating within their borders reached an agreement providing for joint ownership by the countries and companies of the major oil concessions previously owned and managed solely by the companies. It was a development that could have profound significance for the future of international oil.

This so-called "participation" agreement caps a series of earlier accords between a larger group of oil-producing countries and companies, leading to sharply rising per-barrel oil revenues accruing to these governments. As a consequence of negotiations spread over the last several years, these increases in the countries' oil revenues are the combined result of increased posted prices, higher tax rates, and a compensatory adjustment for the devaluation of the dollar. Even before the more recent participation agreement, these improved terms for the exporting countries had led to a sharp rise in per-barrel oil revenues. For the Persian Gulf area as a whole, payments to the governments increased from 86 cents per barrel in 1970 to $1.24 per barrel in 1971, an increase of 44 percent; for Libya, the increase was 64 percent from $1.09 to $1.79 per barrel. An escalation schedule of annual increases will by 1975 result in payments of about $1.45 per barrel in the Persian Gulf, and considerably more in Libya—mainly because of a "transportation premium" arising from its proximity to West European markets. Thus, even in the absence of participation, existing agreements point to rapidly rising oil revenues for the Persian Gulf countries and Libya (not to mention still other oil-producing countries during the next decade), easily two to three times the $8.9 billion level recorded in 1971.

In general, the participation agreement calls for an initial 25 percent ownership of the oil concessions by the producing governments (the detailed terms are to be settled in negotiations between the individual countries and their respective concessionaires). This share would rise in steps to 51 percent by 1983, remaining at that level until expiration of the concessions some years later at dates varying among countries. Compensation for the acquired interests was to be based on book values, with some allowance for inflation but none at all for forgone future production.

Libya, Iraq, and Iran did not join in the overall participation accord. (Still other oil-producing countries could be expected to work out subsequent arrangements patterned on the Persian Gulf accord or to adopt a more independent stance.) Libya was pressing for majority ownership at the outset, while Iraq, which earlier in 1972 had nationalized the principal concessions of the Western-owned Iraq Petroleum Company, was reported to incline towards lower compensation than offered by the other countries in settlement of any acquired interests. In the case of Iran, the international oil companies had relinquished ownership of their properties following nationalization in the early 1950s and had thereupon operated as a consortium of producers under a 25-year agreement expiring in 1979. Formally, therefore, Iran had already gone beyond the participation pattern some time ago, but management continued to be in the hands of the consortium. Negotiations to extend this 1954 agreement to the mid-1990s were in progress at the end of 1972. They are said to call for a doubling (within the present decade) of the rate of oil production by the consortium which, when coupled with price increases already in force under the agreements noted above and others that remained to be worked out, could quickly lift Iran's total oil earnings substantially above the recent annual level of $2.2 billion.

The participation formula includes a provision requiring the international companies to buy back as much of a country's share of crude as the country may wish at an average price falling somewhere between the tax-paid cost of the crude and the posted price, but—it is presumed—sufficiently below the market price to assure some tolerable profit margin for the companies. Such a "buyback" provision does more than ensure that country revenues would not collapse under the weight of the sale of country-owned crude oil on world markets; revenues would be higher and the concessionaire companies would continue to serve as the instrument by which the taxes imposed by the producer governments were passed along to consumers in other countries. In addition, the participation arrangement ensures continued orderly marketing of oil by the companies, relieving the producing countries of an area of responsibility in which, up to the present time, they lack both experience and facilities.

THE PARTICIPATION agreement suggests that, for the time being at least, a workable device for greater host-country control over petroleum

resources has been found. However, the agreement, when coupled with other measures benefiting the producer countries, carries vast, if uncertain, implications for oil prices, for the management of oil production, for international capital markets, and for the future of company-government relations in oil-producing countries—indeed, in raw-materials producing countries in general—throughout the world.

The monetary flows may exceed the capacity of many of the oil-exporting countries to absorb funds productively within their own economies. If this happens, what problems are indicated for the stability of the world monetary system? To look in another direction: to what extent could such amounts of money, if partly directed to armaments, serve to alter the balance of military power within the Middle East?

One of the possible consequences of these monetary flows, recently evident, is that the oil-exporting countries might become large equity holders in companies in the United States and other industrialized countries. A proposal has already been made by Saudi Arabia, through its Minister of Petroleum and Mineral Affairs, that there be a commercial agreement between the United States and Saudi Arabia providing for a preferred place for Saudi oil in the United States and the investment of Saudi capital in the marketing of oil in this country. The economic, political, and strategic implications of such investments by oil-exporting countries, perhaps embodied, as in this case, in broader arrangements, call for careful appraisal.

The long-term effect on oil prices is a key question. Will effective and enduring devices be found to continue the oil companies in their role of providing the producing countries with a high and assured take per barrel of oil exports? Or will country competition eventually erupt, if and when national companies attempt to enter the international oil market on a significant scale?

If oil prices are held up by reason of arrangements between the companies and producer governments, a detached response of acquiescence on the part of major *importing* countries (Western Europe, Japan, to an increasing extent the United States, and conceivably, the energy-deficient less-developed countries) cannot be taken for granted. The importing countries have on the whole made no persistent attempt to modify the existing market structure, which permits producing countries and, to a diminishing degree, companies to enjoy the great economic rents arising from oil production at going prices. It is interesting to speculate on the extent to which the importing countries could cut into the very wide and ever growing margin between real production costs and market prices if they were to use the bargaining power they appear to possess.

It remains to be seen how the companies and producer countries work out their relationships in the area of managerial prerogatives. At levels of participation below 51 percent, the deciding voice will still be that of the companies. However, as country participation moves towards the 51 percent level to be achieved in 1983, a considerable amount of friction seems bound to develop in management decision making.

STOCKHOLM: The Morning After

FOUR YEARS AFTER it had first voted to hold a Conference on the Human Environment, the United Nations General Assembly in December completed the first phase of injecting an environmental viewpoint into the UN system by establishing an Environmental Secretariat. Conceived as a small staff group, it will be guided by a 58-nation governing council, flanked by a Coordinating Board designed to both watch over the interests of and provide access to the UN specialized agencies (FAO, WHO, UNESCO, etc.) and entrusted with allocating the funds—expected to reach $20 million a year for the first five years—voluntarily contributed by the organization's member states.

This simple action poorly reflects the cliffhanger quality of the Stockholm Conference, where details of the new institution and other business were up for decision by 113 attending nations. It is clear that many clouds hung over the two-week meeting when it opened in Stockholm 5 June 1972.

—The absence of the Soviet Union and its satellites, unwilling to bear the political burden of having come to a conference to which East Germany had not been admitted

—The presence of a 17-man Chinese delegation with unknown intentions and equally unknown parliamentary habits

—The ambivalent attitude of the UN specialized agencies who were out to guard their special hunting preserves from intruders but who also scented the environmental money that might replenish their treasuries

—The possibility of a new outbreak of hostilities between the developed and the less-developed countries over the relationship between economic growth and environmental concern

—The anticipated presence in Stockholm of thousands of uninvited observers and would-be par-

ticipants, of different persuasions but united in their contempt for what they considered too narrow a framework and conception of the human environment

—A multitude of public forums attended by scientists and other luminaries of worldwide reputation, likely to attract the attention of the press and relegate the conference itself to a sideshow

—An enormously crowded agenda, every item of which had to be submitted to vote, and therefore open to amendments and discussion.

For several days events at Stockholm seemed to bear out the worst fears. The press was turned off early by the technical character of the debate in the committees and by the repetitiveness of the statements made by spokesmen of countries and organizations in the simultaneously held plenary sessions. Moreover, the most dramatic show took place without press coverage. That was the special working group set up to rewrite the Declaration of Principles, put together over a period of 18 months by a 27-country preparatory committee, but at the insistence of the Chinese delegation reopened in full to rewriting and therefore almost up to the last minute of the conference considered a lost cause.

But when the conference ended on schedule on 16 June, it had accomplished all that could have been expected of it. When it was all over, there was a Declaration of Principles, an Action Plan consisting of 109 recommendations following closely those worked out by the UN Secretariat during the year and a half preceding the conference; and the already noted institutional framework for continuing work within the United Nations. In addition, a follow-up conference was voted for, with date and place left open; 5 June was selected to be celebrated each year as World Environment Day; and the UN Secretary General was asked to review the entire environmental setup within a matter of two years. The standing ovation given by the delegates to Maurice Strong, the conference's Secretary General, was as unusual as it was spontaneous.

The absence of the Eastern bloc turned out to be not too disturbing because a solution via the early admission to the United Nations of the two Germanies was assumed by all; and during the happier months before the Russians pulled out no important differences in principle had emerged. As for the Chinese, their silence, tantamount to nonparticipation in committee work, and their energetic tactics on the Declaration of Principles were puzzling to many. Those who had waited to learn how China managed its environmental problems remained disappointed.

Relationships between the conference and the parallel meetings and events were intelligently handled. The conference was sufficiently shielded from intrusions to be able to do its assigned work, yet many delegates visited and participated in the activities of the unofficial emissaries from around the world in sufficient numbers to forestall credible charges of ivory tower isolation.

WHAT DIFFERENCE will the conference have made to the future of the human environment? On a general level, a major conference recommendation led to adding to the UN establishment a new group—one that holds a brief for reviewing and coordinating activities from an environmental point of view; that can stimulate existing activities and initiate new ones; that can report on the worldwide status of developments in the field; and that can, as is so often the function of the UN, defuse conflict. Many enterprises already on the way will receive added momentum, especially in the field of monitoring and "watchfulness."

Not every specific recommendation of this conference will be carried out, at least not immediately. Less than a month after an almost unanimous conference endorsement of a 10-year moratorium on commercial whaling, the International Whaling Commission ignored the proposal (though its constituent countries took some other steps to show good will).

On the other hand, an agreement was reached in mid-November at a 91-nation meeting in London to put brakes on ocean dumping of noxious material. The agreement, which will come into force when 15 nations have ratified it, was put together by a special Intergovernmental Working Group on Marine Pollution set up in the spring of 1971 as an integral part of the preparations for the Stockholm Conference. The conference itself endorsed the group's work and asked participating nations to attend the London conference and bring it to a successful conclusion. This has now happened.

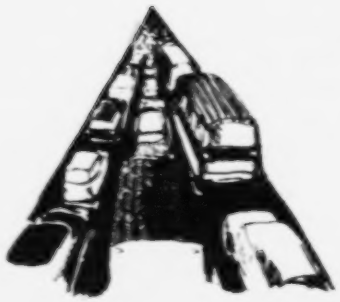
A success of this kind augurs well for other initiatives that emerged from the conference. Among them are an endorsement of a draft convention on the World Heritage Trust; an invitation to countries to sign the Convention on Wetlands of International Importance; a call for a working group to establish a convention on game regulation to protect species inhabiting international waters or migrating across borders; a recommendation to explore creation of an Institute for Tropical Marine Studies; and a call for a meeting to establish environmental improvement areas. Some of these will go, some won't; yet adoption of the Ocean Dumping Convention has not only removed the chill that followed the Whaling Commission's lack of responsiveness but will undoubtedly add momentum to other recommendations.

Beyond these organizational and operational perspectives, there is the less palpable but not therefore less real achievement of the Declaration of Principles. Some may find the prose unstimulating, but only those who doubt that ideas can move men will shrug off the declaration as just one more wall decoration. Assertions such as that "states have . . . the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction" (Principle 21), or that "states shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution

and other environmental damage caused by activities within the jurisdiction or control of such states to areas beyond their jurisdiction" (Principle 22) may have been made before, but their elevation to a declared UN policy is cause for satisfaction, particularly in so new a field as that of environmental concern. The Stockholm documents with all their shortcomings represent a reference point, an assertion of authority, a new plateau from which work can now radiate out along many directions.

After establishing the Environmental Secretariat, the General Assembly chose Nairobi as its headquarters. The immediate reaction has been that the decision comports poorly with the intended role of the new staff group: coordinator, watchdog, and stimulator of other UN agencies and nongovernmental organizations. A staff in perpetual travel status or an isolated band of thinkers in Nairobi are equally unattractive alternatives. One would strain the resources available to the new organization, the other greatly reduce its effectiveness. Either might make it difficult to attract the talent that is required, the more so since the budgeted staff of environmental specialists barely exceeds a dozen. All other help must be financed from the Environment Fund. It would be ironic if one of the results of the pioneering efforts of the conference's Secretary General to stir the interest of the less developed countries in environmental issues should be higher cost, or lower effectiveness, of the new unit by reason of a location ill-fitted to its task.

Perhaps the difficulties of site may not turn out to be as great as they now appear. Moreover, one can take the view that the decision may sustain the developing countries' interest in an issue they not long ago were apt to shrug off as a plaything of the rich. Conversely, one must hope that the organizational awkwardness of the site will not dampen the enthusiasm of the more advanced countries whose contribution of money and experience is essential to carrying out present plans for assembling staff and developing a work program by midsummer. The election of Maurice Strong as executive director offers reassurance that both objectives will be attained.



Should Highways Pay For Transit?

CONCERN AND ANNOYANCE over urban transportation are scarcely new. Julius Caesar banned daytime wagon movements from the streets of Rome because of traffic congestion—and generated a good deal of nighttime traffic noise. The intensity of frustration and alarm over the modern aspects of the problem has in recent years brought increasing support for far-reaching changes. Several innovations were initiated or seriously considered during the year.

Most of the current problems of urban transportation are tied to the automobile. The bill of particulars of the indictment runs something like this. The auto is a major source of congestion, air pollution, and noise. Urban highways are very expensive, disruptive of neighborhoods, and often destructive of parks and of aesthetic and historic features of the city. The physically handicapped, the old, and the young, who cannot drive, and those too poor to own cars become steadily more disadvantaged by the declines in transit service that have accompanied the switch to private cars from busses, streetcars, and commuter trains. The yearly total of mass transit riders now is only a quarter of the 1946 level.

A major response has been to subsidize mass transit from general funds. A recent development, however, has been to subsidize it from highway-user funds. California has increased the price of gasoline by making it subject to tax at the sales tax rate, the proceeds being used in populous counties for transit subsidy. This has been of help to the San Francisco BART system, which began operations, after long delay, during 1972. In December Michigan increased its gasoline tax from 7 to 9 cents a gallon. A quarter of the income generated by the 2-cent rise will go for mass transit.

A much more significant case of this kind of transfer *almost* happened during the year. An attempt to tap the Highway Trust Fund on behalf of mass transit failed in Congress last fall. But the unexpectedly strong support for the proposal suggests that the next Congress may take this route.

There has been some federal financing of urban mass transit since the Urban Mass Transit Act of 1970, which authorized $3.1 billion in federal funds for the improvement over a five-year period of bus, rapid transit, and commuter rail systems. For the 1973 fiscal year, federal funding under this act is $400 million.

The much larger Highway Trust Fund has been dedicated to highways only since its establishment in 1956. The fund is drawn from the 4 cents per gallon tax on gasoline, plus taxes on tires and truck tonnage. Collections are now running at more than $5 billion a year. In 1970 small sums from the Trust Fund were allocated for bus lanes and fringe parking areas; these applications, though non-traditional, nevertheless involved highway use.

Last March the Administration recommended the use of a portion of the Highway Trust Fund for an expanded program of mass transit construction. The proposed level of financing for mass transit started from about 20 percent of the fund at the beginning and increased to about 40 percent in the last years of the decade. By that time, annual Trust Fund levels were projected at approximately $7 billion. The money would have been available on a matching grant basis, with $3 of local expenditures required for each $7 of federal grants. Urban areas could have used the money for either highways or transit, but it was expected that the latter use would receive the bulk of the funds. The Administration's plan was hailed by transit advocates as a major breakthrough.

In August, the Senate Public Works Committee followed the Administration lead and voted to open the Trust Fund to purchase buses and build more bus lanes. In September, the full Senate went further and passed an amended bill which funded fixed rail projects as well.

In October, the House of Representatives rejected the innovation in transit financing. An amendment to the Highway Act permitting such financing was ruled out of order on the ground that such basic changes had to come in tax legislation, rather than in a general authorization bill. The Senate then passed a compromise highway bill, which increased transit funding, but from general funds only. The bill died in the House. Appropriation of funds for the traditional highway program died with it.

As a consequence, there will be pressure for a new bill by April, when advance highway fund allocations have to be made. It seems likely that the new bill will include increased funding for transit, with a good chance that much of the money will come from the Highway Trust Fund.

ONE OF THE PROBLEMS with subsidy to mass transit is that of deciding just how much the subsidy ought to be. The Administration has taken the position that only capital costs should be covered, though the bill passed by the Senate provided for operating cost subsidy as well.

An extreme example of subsidy occurred in Rome, Italy, which offered free buses at peak commuting hours for two months during the summer of 1972. Ridership increased, but there appeared to be little decline in traffic. Many pedestrians became bus riders, some auto drivers drove downtown and performed errands by bus while there, and others took the bus and turned the car over to their wives.

An alternative to transit subsidy is employment of pricing devices tied to auto use. One form of this is to attract more riders by rationing parking space for private automobiles through higher rates or surcharges at lots in downtown areas. There has been a good deal of interest in this idea (and some vociferous opposition). Both reactions greeted such a proposal for the Washington metropolitan area, put forward late in the year.

Another way of reducing the number of cars on the road is to use tolls, in reverse, as an incentive. Recently, an economist suggested somewhat facetiously that a toll might vary inversely with the number of passengers in the car. The San Francisco Bay Bridge Authority did this in all seriousness by adjusting tolls to encourage car pooling. Starting 1 June, an express lane was set aside during peak commuting hours for the use of cars with three or more riders. As an added lure, a greatly reduced toll rate—$1 a *month* per car instead of 50¢ a *day*—was offered for automobiles that regularly carry at least three people, thus affording opportunity to save money as well as time. By the end of the year, 2,000 cars a day on the average were taking the express lane and more than two-thirds of them were using the dollar-a-month cards.

THE GENIE IN THE BOTTLE: THINK BEFORE RELEASING

EVEN THE INTENDED results of new technology are hard to predict; to forecast the direct side effects and the second- and third-round consequences of a new device or method is even harder. A full assessment is obviously impossible, but more and more people have come to believe that much can and should be done toward anticipating things better. A beginning was made in the closing days of the 92nd Congress when an Office of Technology Assessment was voted into existence.

The new legislation follows in many respects recommendations made in 1969 by the panel on technology assessment of the National Academy of Sciences. The idea of such an office had first surfaced in 1967 in a bill introduced in the House by then Congressman Daddario. Technology assessment as such has a much longer history. It is routinely carried out under a variety of labels, in both industry and government, in the pursuit of private and public objectives. The often-heard charge that "technology is running wild" fails to consider that uncounted possibilities for innovation are never translated into production or application precisely because the side effects are considered intolerable. Even, and perhaps especially, the much-criticized pharmaceuticals industry casts out large numbers of substances for every one it adopts. That no one keeps count does not mean that "anything goes."

The more recent idea of technology assessment as a responsibility of society, and thus of government, arises rather from the potential that modern science and technology afford for calamities on a very large scale, and because prior screening for undesirable consequences is often too costly for anyone but government. Just as important is the thought that desirable technologies may not come to the fore because economic incentives might be lagging or because it is difficult for any single producer to reap for long the benefits of his inventiveness. Thus technology assessment should not be thought of merely as a brake; it also can be a throttle.

The rationale of the new act is quickly summarized. Technological applications, it asserts, are "large and growing in scale and increasingly extensive, pervasive and critical in their impact, beneficial and adverse, on the natural and social environment." For this reason the consequences have to be "anticipated, understood, and considered in determination of public policy on existing and emerging national problems." Federal agencies are not now capable of providing Congress with the appropriate information,

nor is Congress itself so equipped. Hence the need for a new mechanism, applicable especially in cases of federal government support for technological applications or for management or regulation thereof.

It is difficult to judge whether the newly created office is the best possible mechanism for accomplishing the task. The office is placed within the legislative branch of the government and will be responsible only to it. It is in fact a joint committee of the Congress, consisting of a board and a director, and assisted by an advisory council. Composed of 6 senators and 6 members of the House—half from each party—plus the director, the 13-man board will be supported by a staff to do the substantive work. Its function will be wholly analytical. The office will evaluate a given project in terms of impacts, cause-and-effect relationships, technological alternatives, identification of needed research or data and associated activities. It will not, according to the language of the act, make recommendations. One imagines, however, that these would be implicit in the findings. Initiative for undertaking studies will lie within the Congress, relayed to the office through congressional committees, though anybody but a committee's chairman or ranking minority member must persuade a majority of his committee to join him before a request can be passed on to the Office of Technology Assessment.

Since the Advisory Council may recommend (though not direct) that the board initiate assessments, its composition is of interest. Of the 12 members, the act specifies only the Comptroller General and the Director of the Congressional Research Service of the Library of Congress. The remaining 10 are to be appointed by the board from persons in public life. These are characterized as "persons eminent in one or more fields of the physical, biological, or social sciences or engineering, or experienced in the administration of technological activities, or who may be judged qualified on the basis of contributions made to educational or public activities." Obviously, this leaves a large field of choice. However, the activity is not envisaged as exclusively or perhaps even predominantly carried out by or pertinent to scientists. In defining the impact of technology the act specifically enumerates political, social, and economic effects.

Because the scope is vast, the board is authorized to make use of outside talent. It may form task forces, employ outside organizations and institutions, and specifically have resort to the facilities of the Library of Congress and the National Science Foundation (NSF). With all these alternatives formally established in the act, one may hope that the new office will not be able, even if it so desired, to live in isolation from the public. Moreover, with only $5 million authorized (and not yet appropriated) for its first two years of life, it will have to count heavily on funds from other agencies, especially NSF, if it hopes to make a respectable showing.

As IT FINALLY emerged from the Congress, the act followed only one-half of the organizational recommendation of the National Academy panel mentioned earlier. That panel had suggested a double-barrelled structure in which the Congress would equip itself with a unit not essentially different from what it will now have, paralleled by a twin in the executive branch, specifically in the Office of Science and Technology. A reading of the National Academy panel report discloses that the idea had been to bring technology assessment close to the seat of executive power and thus provide for initiative in both branches of government. Perhaps the failure to establish an executive mechanism reflects the growing desire of Congress to reassert its power. However, another panel suggestion—that the new office should begin life by limiting its activity to government-funded or -sponsored projects, rather than spread itself over the entire economy—has been followed, as has the inclusion of positive goals for technology.

Apart from the difficulties of starting any new function, the new office faces some specific problems. A provision that all of its findings be made public was deleted as the bill moved toward passage. Perhaps the office will release its reports in any case; indeed, an open policy will be essential to enlisting support of the professional community. Another problem may be difficulty of access to the office; here the Advisory Council could be very useful. Finally, there is a danger that people may expect too much from technology assessment.

There is no way of by-passing political choices. Technology assessment can only illuminate, not replace, them. It can, however, be immensely helpful in building up a fund of experience as to what are the "right questions," and to pioneer in a coherent, consistent, and comprehensive approach. It can also be useful in stimulating similar activities throughout the executive branch, not in adversary proceedings, but by example. The caliber of both board and staff will determine the success of this new venture. So will the inclinations of the Advisory Council and a public attitude prepared to concede a generous grace period during which time scales, urgencies, and other priority criteria can be determined. Having received astonishingly little publicity outside the technical press, technology assessment could well turn out to have been to the 92nd Congress what the Environmental Impact Statement was to the 91st—the sleeper of the year.

Bi- and Multi-Laterals

THROUGHOUT THE YEAR the United States initiated or intensified bilateral and multilateral arrangements on several environmental matters. Receiving most attention was the agreement with the Soviet Union signed in May. It envisages joint activities in 11 environmental problem areas. On 3 of these—wildlife, urban problems, and water pollution—working parties are scheduled to begin operating early in 1973.

Other formal bilateral arrangements have been entered with Canada, focussing on Great Lakes water quality, and with Mexico, regarding salinity problems on shared rivers. Cooperation with Japan was

begun through an informal interministerial committee which perhaps will be formalized later along the lines of the U.S.–U.S.S.R. agreement; the committee considers both technical questions and policy relating to major problems of pollution. On a broader scale, the United States has been an active participant in both research and policy discussions in: the Organisation for Economic Co-operation and Development, where the principle of "the polluter pays" has been adopted, and efforts are being made to "harmonize" environmental standards so as to forestall "disharmony" in foreign trade matters, and as a first approach, provide for notification of regulatory actions; the Economic Commission for Europe, long stymied because of the "East Germany syndrome" but late in the year ready to resume its role; and NATO's Committee on Challenges of Modern Society, one of whose undertakings is directed toward uniform monitoring of air pollution in three major cities in different parts of the world.

NATIONAL FISHING QUOTAS

IN JUNE THE 15 member states of the International Commission for the Northwest Atlantic Fisheries (ICNAF) adopted a system of national quotas which allocated among themselves shares of the estimated yields of 14 separate stocks of ground fish. In the long history of international fisheries arrangements last year's action was the first major attempt to divide a portion of the sea's wealth explicitly among a large number of countries. A related, and even more innovative, proposal was advanced in October when the U.S. commissioners asked that regulation of fishing effort—that is, of the equipment and manpower used—be considered in the ICNAF area. This memorandum was followed a month later by suggestions of measures that could be used to control effort in those portions of the total area that are of most direct interest to U.S. fishermen.

The size of the Northwest Atlantic area—which extends north from the latitude of Cape Hatteras almost to the top of Baffin Bay and east from the North American Coast to the longitude of Greenland's Cape Farewell on the 44th parallel—and the importance of its fisheries make the new developments significant in their own right. They also are significant for the effects they could have upon the forthcoming United Nations Conference on the Law of the Sea. The dates for that long-anticipated conference were definitely set during the year: the procedural work will begin in November 1973, with substantive deliberations to start early in 1974.

THE CENTURIES-OLD principle of freedom of the seas, which, among other things, guarantees that ocean fisheries are free and open to all comers, is the root cause of almost every modern problem of fisheries management. With open access, no fisherman has incentive to restrain his catch in the interest of future returns. What he leaves in the sea for tomorrow will be taken by others today. One result is physical depletion. With every man—and every nation—for himself, the annual catch of many stocks of fish has been pushed beyond the level at which maximum yield can be sustained over long periods. Evidence of depletion is found throughout the world, from the whales of the Antarctic to the herrings of the North Sea. Another result is economic waste—that is, the redundant effort that could have been profitably expended in other directions. This kind of waste is harder to gauge than physical waste, though certainly much more significant. It was estimated in 1968, for example, that the overall level of effort in the North Atlantic could have been reduced by 10 to 20 percent with no decrease—perhaps with even a small increase—in average long-term catches. In money terms this would have saved $50 million to $100 million in annual fishing costs. An estimate for 1973 would be considerably larger because of the increase in fishing effort since then.

The new Northwest Atlantic arrangement is by far the most elaborate quota program ever inaugurated. The convention for the area, dating from 1950, provided only limited regulations. The most important of these was establishment of a minimum size of the mesh used in nets, designed to let smaller fish escape. Other permitted limitations were quotas on total catch, closed seasons, closed areas, and restrictions on gear.

The controls that were adopted proved ineffective in the face of the large and continued increases in fishing. It has become possible to decimate a fish stock in one or two seasons. For example, in one subarea of the Northwest Atlantic, the haddock catch had averaged 50,000 tons for many years until 1965 and 1966, when there was a large national increase in stock. This attracted an expedition of Soviet vessels. The catch, mostly by U.S. and Russian fishermen, during those two years was 155,000 and 127,000 tons respectively. This level was much more than the stock could bear and it fell off rapidly, to a low of 12,000 tons in 1971. For 1973 a total quota of only 6,000 tons has been set, a limit particularly damaging to many New England fishermen, who depend heavily on haddock for their income.

The failure of the regulatory devices available to ICNAF prompted discussion of new techniques. After considering both limitations of effort and national stock-by-stock quotas, the commission decided that the first alternative was too dif-

ficult and that the second, though also difficult, seemed more feasible. It was thought also that if agreement could be reached on distributing the catch, the individual countries could if they wished take steps to enable their vessels to operate more efficiently. The convention was amended in January 1972 to permit employment of national quotas.

The June agreement was signed by the 15 nations which then were members of the commission: Canada, Denmark, France, West Germany, Iceland, Italy, Japan, Norway, Poland, Portugal, Romania, Spain, U.S.S.R., United Kingdom, and United States. Bulgaria joined later in the year, and Cuba indicated intentions of doing so. East Germany sends vessels to the area and is expected to join when its problems of sovereignty are more fully resolved.

In terms of total catch, when 1973 quotas for all of the 14 species are added together, the five countries with the largest quotas in the Northwest Atlantic are U.S.S.R., with 22.3 percent of the total; Spain, with 16.5 percent; Canada, 16.3; Portugal, 11.2; and the United States, 10.2. The percentages drop down to 0.7 for both Iceland and Italy.

The formula on which allocations were based took account of both past and present patterns of catch; the special interests as coastal states of Canada and the United States; and other special conditions, including the potential interests of newcomers. It was finally decided that the records of the past ten years and of the past three years should each be given a 40 percent weight, with an additional 10 percent as the preferential share of the coastal states and the remaining 10 percent reserved for new entrants and special conditions.

In setting the quotas for individual species, consideration was given to the likelihood that efforts displaced from catching one stock would be diverted to others. Consequently, quotas were also set for some stocks that are not being fully utilized at present.

IN ADOPTING the new quotas ICNAF members faced up to the fact that past programs of management had been ineffective. This in itself was a step forward. Even more impressive was the fact that so many countries with such divergent interests could reach specific agreement on sharing the yields of so many kinds of fish. A ceiling on the catch of each species should, if set correctly, go far toward protecting the stocks from depletion. And each nation, with the assurance of an assigned share of the total catch, should, presumably, be able to regulate its own fishing effort so as to reduce wasteful use of excess capital or manpower.

How well will the system work? Here there are some large questions. Some are inherent in the agreement itself. The most important of these is lack of provision for transferring quotas, which makes for serious inflexibility.

A related problem is the difficulty of accommodating new parties wishing to enter the fishery. Several countries have started fishing within the region in recent years and others may wish to enter in the future. The reservation of 10 percent for both new entrants and special conditions is not large. At some future point, the only way for accommodating new entry may be by decreasing the shares of the present members.

The shelter that national quotas appear to give to member nations wishing to increase the efficiency of their own fleets may turn out to be more theoretical than real, and thus not go far toward reducing economic waste in fisheries. One reason for this is that a heavy investment of effort at the opening of the season could lead to the dispersal and thinning of the stocks, making it more difficult to take fish later on. Thus, nations that rush in first with many large vessels will be able to fill their quotas easily, while nations without such capacity may find that their quotas come at higher costs.

In addition to these and other special problems are the costs and difficulties of administering a complex multi-nation, multi-fish program. Revision of total quotas and their allocations will be a major task; the job of monitoring and enforcement probably will be much larger.

Doubts that the new system would be effective prompted the U.S. proposals for regulating fishing effort in addition to national quotas. The October memorandum, asking that the general issue be considered, was based on "the conclusion that catch quotas on a species by species basis, despite the refinements and broader application initiated by the Commission, are not alone sufficient to assure stable resource conditions in the Northwest Atlantic." The November memorandum suggested methods by which effort could be regulated in two of the six subdivisions of the Northwest Atlantic—subareas 5 and 6, off the U.S. coast from Maine to Cape Hatteras; from Delaware on south it extends eastward clear to Long. 44° W.

The U.S. memorandum offered a method for expressing the fishing effort of various countries on a comparable basis. In this formula, small side trawlers of 150 tons or less were given a value of 1; vessels with more fishing power because of size or design were rated higher, up to a value of 6.65 for a West German stern trawler over 900 tons in size. Although it made no specific recommendations about how many standardized vessel days should be permitted in the two subareas, the memorandum pointed out that the total effort for producing the maximum yield had been reached by 1965 and that in 1971 the effort was 31 percent above the level appropriate to the maximum sustained yield.

The memorandum does not recommend how the total level of effort for the subareas should be distributed. It does, however, suggest that, in general, allocations should be based on the same formula used in setting the national quotas, with a few modifications. Some of the modifications could be quite important, particularly the statements that "new entries should not be a significant factor" and that particular attention should be given to the unique situation of the relatively immobile fleets of small coastal vessels.

Excessive competition is a major problem in ocean fisheries management everywhere, not just in the Northwestern Atlantic. The U.S. proposal for regulating effort attacks the problem much more directly than does a system of national quotas only. It will be interesting to see whether the ICNAF considers the suggestion for effort controls, as the U.S. commissioners have asked, and if so what

detailed arrangements might be agreed upon. Acceptance of a program that would set limits upon the ways that member nations use their quotas will be hard to obtain. Many of the problems posed by the simple quota system would presumably remain, particularly the inflexibilities of no transfers among nations and the difficulties of determining the amount of allocations for newcomers. More important will be the complexities of management and enforcement that will inevitably accompany a system that attempts to control both outputs and inputs of a large number of nations for a large number of resources.

The developments taking place in the Northwest Atlantic are particularly critical for the decisions that will be discussed at the forthcoming UN Conference on the Law of the Sea. In a sense, these developments are an attempt to demonstrate the validity of the "stock-by-stock" approach as against the "economic zone" approach, the two most important alternatives for the resolution of fishery problems.

The "economic zone" approach, as suggested by Latin American countries among others, calls for the extension of jurisdiction by coastal nations, giving them the authority to determine how and in what way the resources off their coasts will be utilized. For a variety of reasons, many of the members of ICNAF (in particular the U.S., U.S.S.R., and Japan), are opposed to the extension of jurisdictions. They have proposed the alternative of resolving fishery problems by multilateral agreements on each stock of fish.

There are, therefore, some pressures to make the ICNAF arrangements work. But the gamble is risky. If the system works (at least through the holding of the UN Conference), it may help to support the arguments in favor of the "stock-by-stock" approach but will not necessarily prevent the widespread adoption of economic zones. If the system fails, the adoption of economic zones is almost assured.

New RFF Books

The World Petroleum Market. M. A. Adelman. 7 x 10, 460 pp. December 1972. Cloth, $22.50.

Natural Environments: Studies in Theoretical and Applied Analysis. John V. Krutilla, ed. 360 pp. December 1972. Cloth, $16.50.

Alaskan Oil: Alternative Routes and Markets. Charles J. Cicchetti. 162 pp. December 1972. Paper, $5.00.

RFF Reprint Series

The following reprints of staff writings have been added to the RFF Reprint Series. Single copies are available free on request to Resources for the Future. Additional copies are priced as listed.

102. *Environmental Quality and International Trade*, by Ralph C. d'Arge and Allen V. Kneese. From *International Organization* (vol. 26: 2). 1972. More than one copy, 25¢ each.

103. *Two Studies in Water Resources Management: The Temporal Allocation of Ground Water—a Simulation Approach*, by John D. Bredehoeft and Robert A. Young; and *Digital Computer Simulation for Solving Management Problems of Conjunctive Groundwater and Surface Water Systems*, by Robert A. Young and John D. Bredehoeft. From *Water Resources Research*, vol. 6, no. 1 (February 1970) and vol. 8, no. 3 (June 1972). More than one copy, $1.00 each.

104. *The Property Tax Is a Progressive Tax*, by M. Mason Gaffney. From *Proceedings of the Sixty-Fourth Annual Conference on Taxation*, sponsored by the National Tax Association, 1971. More than one copy, 25¢ each.

105. *The Future of Nonmetropolitan America*, by Marion Clawson. From *The American Scholar*, vol. 42, no. 1 (Winter 1972-73). More than one copy, 25¢ each.

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